

**Notice of Allowability**

Application No.

10/675,178

Examiner

Douglas M. Menz

Applicant(s)

HWANG ET AL.

Art Unit

2891

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 5/27/05.
2. ☒ The allowed claim(s) is/are 1-7.
3. ☐ The drawings filed on \_\_\_\_\_ are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some\* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

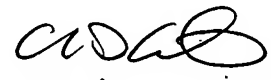
Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date 5/27/05, 9/30/03
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☒ Other Search History.

  
Christian Wilson  
Primary Examiner

## **DETAILED ACTION**

### ***Drawings***

Figures 1-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Allowable Subject Matter***

Claims 1-7 are allowed.

The following is an examiner's statement of reasons for allowance:

Applicant's admitted prior art (Fig. 2) discloses a triode field emission device using a carbon nanotube, comprising:

A bottom electrode (202, Fig. 2) formed on an insulation substrate;

An array of carbon nanotube mixture (206, Fig. 2) formed on the bottom electrode;

An insulating mesh gate plate (204, Fig. 2) having a plurality of openings corresponding to the locations of the carbon nanotube mixture;

An extraction electrode (205, Fig. 2) formed on the insulating mesh gate plate;

A top electrode (208, Fig. 2) formed apart from the extraction electrode with a predetermined space in between; and

A first spacer (207, Fig. 2) formed between the extraction electrode and the top electrode.

Applicant's admitted prior art does not disclose wherein the openings of the insulating mesh gate plate on the upper part of the openings are smaller than the lower part. Watanabe (US 5332627) discloses a Spindt type field emitter (Figs. 10-11E) with an inversely tapered insulating film (502, Fig. 10), which would correspond to Applicant's insulating mesh gate plate. The purpose of this inverse taper is to provide extra support for the gate electrode as taught by Watanabe (Col. 11, lines: 45-60). This extra support issue is generated by the physical structure of the single tip Spindt type emitter being of a conical shape made of a metal such as Mo or W (Col. 10, lines: 35-45) wherein the base of the cone is several orders of magnitude greater than the tip of the emitter. Therefore, it would not have been obvious to one of ordinary skill in the art to incorporate an inversely tapered insulating film into a carbon nanotube mixture based field emission device.

Consequently, there is no teaching or suggestion in the art of record disclosing a carbon nanotube mixture based triode field emission device in combination with an insulating mesh gate plate having a plurality of openings corresponding to the locations

Art Unit: 2891

of the carbon nanotube mixture, wherein the upper part of the openings are smaller than the lower part of the openings. Both independent claims 1 and 7 contain this allowable subject matter and are therefore deemed allowable along with claim 1s dependent claims 2-6.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patent 6515415 discloses a triode carbon nanotube field emission display.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas M. Menz whose telephone number is 571-272-1877. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2891

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DM

A handwritten signature in black ink, appearing to read 'CWilson'.

Christian Wilson  
Primary Examiner